6.—An annotated list of lichens from the coastal limestone near Perth, Western Australia

by N. C. Sammy[1] and G. G. Smith[1]

Manuscript received 18 July, 1972; accepted 16 April, 1974.

Abstract

Records of distribution are given for thirteen lichen species of the genera *Aspicilia, Buellia, Caloplaca, Dermatocarpon, Diploschistes, Fulgensia, Lecidea, Leptogium, Toninia, Verrucaria* and *Xanthoria* occurring in the limestone belt along thirty miles of coastline near Perth, Western Australia.

The habitat preferences and frequency of each species are evaluated.

Introduction

The Swan Coastal Plain is a narrow strip of sandy country along the coast of South-Western Australia. It is composed almost entirely of fluviatile and eolian sediments derived originally from the PreCambrian land mass, the western edge of which is called the Darling Scarp. The western border of the plain is composed largely of the Spearwood Dune System of Pleistocene age and is partially overlain on its seaward edge by a very narrow coastal strip of Post-Glacial and contemporary sands of the Quindalup Dune System (McArthur and Bettenay 1960, Fairbridge 1950).

The Spearwood Dunes have a core of calcareous eolianite (locally called the Coastal Limestone) and residual brown and yellow sands resulting from leaching of the carbonate from the rock core. The limestone is heterogeneous in that it has varying proportions of siliceous grains and calcareous fragments of marine organisms bound by fine calcareous cement. Much of this limestone is porous, friable and often stratified and cross-bedded (Figure 1). Fine grained travertines have been secondarily deposited in the eolianite and are exposed abundantly along the coast as karst features in the forms of hard, gray mantles, solution pipes and pinnacles (Figure 2). Aerial erosion of the eolianite and the travertines results in pitted and jagged rock surfaces. The sea cliffs mostly have the more highly incised form of weathering, especially in the extreme upper littoral where both physical and biological agencies of marine erosion are strongly active (Figure 3).

This much-dissected form of the Coastal Limestone with its richly convoluted surfaces provides a large variety of ecological niches for lichens occurring upshore from the splash zone of the extreme upper littoral where *Verrucaria maura* Wahl., occurs. The limestone exposures of the metropolitan sector of the coast were investigated for their lichen flora, the region sampled including some thirty miles of the coast between Cape Peron South (locally called Point Peron) and North Beach. Also included in the survey were limestone sites at Garden and Rottnest Islands near Fremantle, limestone cliffs of the Swan River Estuary and a single outcrop at Point Mount Henry on the Canning River (Figure 4). Some of the species on limestone also occur on wood and bark of trees and shrubs in the vicinity, and these occurrences are also recorded.

Thirteen species of lichens were collected from the study area, and of these the most abundant were *Buellia alboatra* (Hoffm.) Branth. and Rostr., *Fulgensia bracteata* (Hoffm.) Räs., and *Xanthoria ectanea* (Ach.) Räs. ex R. Filson. The voucher specimens cited here are kept in

Figure 1.—Limestone cliffs at Point Mount Henry, showing bedding planes.

[1] Botany Department, University of Western Australia, Nedlands, W.A. 6009.

Figure 2.—Travertine limestone at North Beach with *Buellia alboatra*. This limestone is a few feet above high water mark of winter storm tides (beach in the background).

the Herbarium of the Botany Department, University of W. A. (UWA).

The classification used below is that of Mattick (1954).

ASCOLICHENES

Verrucariaceae

Verrucaria maura Wahl., in Ach. Meth. Lich. Suppl. 19. (1803). Occasional, as a black to dark green, encrusting growth immediately above the littorinid zone of *Melaraphe unifasciata* (Gray) in the splash and spray zone of the extreme upper littoral of limestone sea cliffs. Cape Peron South (UWA 666, UWA 624); Garden I., at the southern end (UWA 1044) and at Entrance Point (UWA 1049, UWA 1050); Rottnest I., at Radar Reef (UWA 1093); Cottesloe, at Mudurup Reef (UWA 1397); North Beach (UWA 714).

Dermatocarpaceae

Dermatocarpon hepaticum (Ach.) Th. Fries in Nova Acta Reg. Soc. Scient. Upsalla, ser. 3, VII: 355 (1861).

Endocarpon hepaticum Ach. in Kgl. Vet. Akad. Nya Handl., 156 (1809); and Lichen. Univers. 298 (1810).

Common on friable limestone and on shallow soil overlying limestone, usually in shaded sites. Limestone cliffs of the Swan River Estuary at Kings Park (UWA 733), Rocky Bay (UWA 793, UWA 1029) and Point Roe (UWA 794). Rottnest I., common on limestone about the salt lakes (UWA 1097, UWA 1087).

Diploschistaceae

Diploschistes scruposus (Schreb.) Norm. in Nyt Magazin for Naturv. 7: 232 (1853).

Urceolaria scruposa (Schreb.) Ach. in Lich. Suec. 32 (1798). *Lichen scruposus* Schreb., in Spic. Fl. Lips. 133 (1771).

Common on limestone cliffs of the Swan River Estuary at Kings Park (UWA 626) and Rocky Bay (UWA 793, UWA 795).

Collemaceae

Leptogium phyllocarpum (Pers.) Mont., Ann. Sci. Nat. Bot. III, 10: 134 (1848).

Collema phyllocarpum Pers. in Gaud. Voyag. Uranie, 264 (1826).

Rare. Rottnest I., on limestone at Lake Herschell (UWA 1096); North Beach, in moss swards on limestone (UWA 717); Point Mount Henry, on trunk of Tuart tree (*Eucalyptus gomphocephala* DC.) (UWA 607); Kings Park, on trunks of Tuart trees (UWA 1009); Yanchep, in moss swards on limestone at Silver Stocking Cave (UWA 1030).

Lecideaceae

Lecidea decipiens (Ehrh.) Ach. Method. Lich. 60 (1803) and Synops. Lich. 53 (1814).

Psora decipiens (Ehrh.) Hoffm. in Descr. Pl. Crypt. 2: 63 (1794).

Biatora decipiens (Ehrh.) E. Fries in Lichen. Europ. Reform. 252 (1831).

Lichen decipiens Ehrh. in Hedw. Descr. et Adumbr. Muscor. Frondos 2: 7 (1789).

Occasional on soil overlying limestone outcrops along the Swan River Estuary, Rocky Bay (UWA 798); Rottnest I., on indurated limestone at Lake Herschell (UWA 1086). Preiss collected

Figure 3.—Sea cliff at Mudurup Reef, Cottesloe, at low tide, showing incised form of weathering. *Verrucaria maura* occurs sparsely in the supra-littoral below the visor or overhang of the cliff.

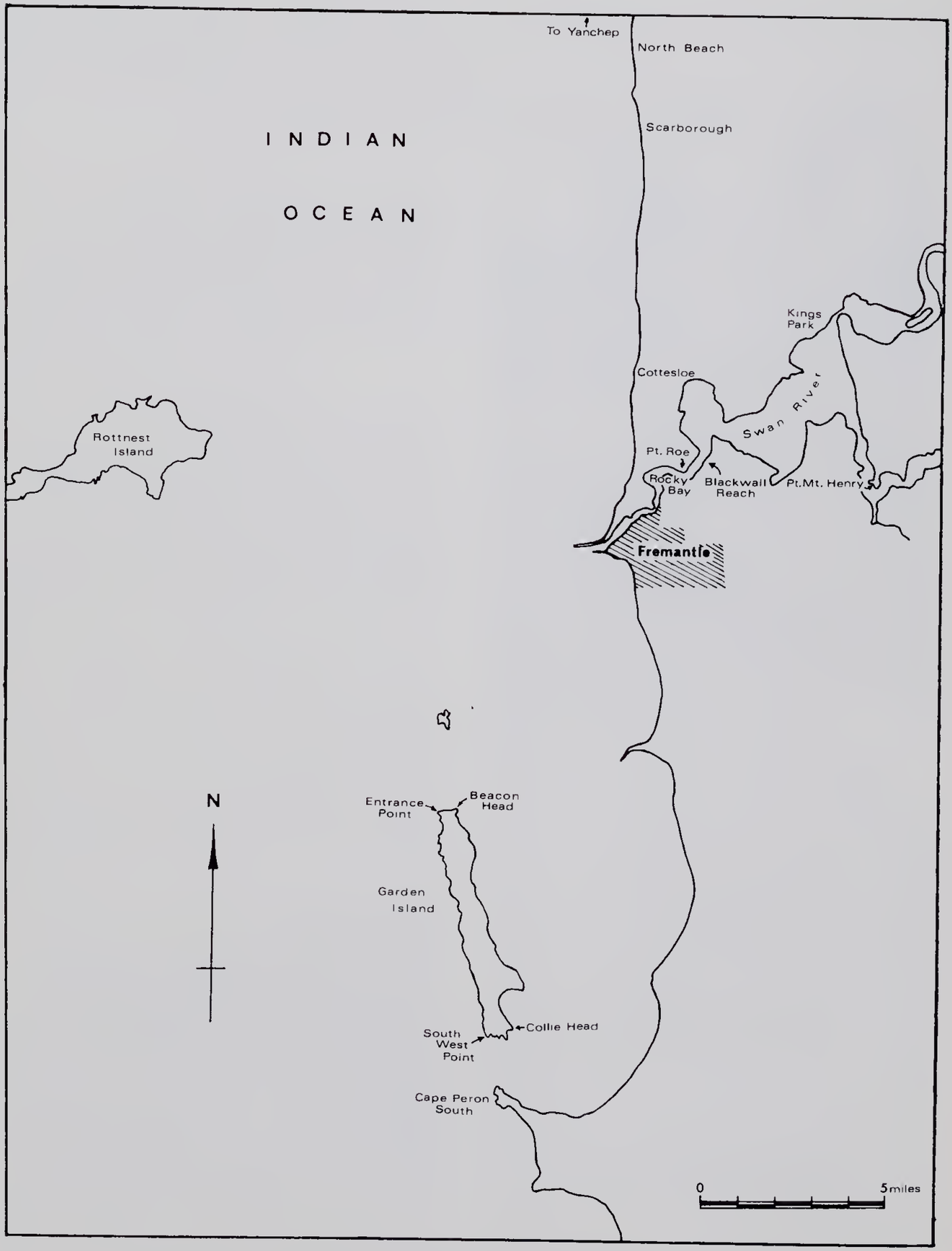

Figure 4.—Locality map of the study area.

this species from sandy soil near a lake at Rottnest I. (Fries 1846).

Lecidea plana (Lahm) Nyl. in Flora 55:552 (1872).

Lecidella plana Lahm in Koerb. Par. Lich. 211 (1865).

Frequent on coastal limestone, but easily overlooked. Point Roe in the lower Swan River Estuary (UWA 799); Cape Peron South (UWA 1051); Rottnest I., on indurated limestone along the banks of Lake Herschell (UWA 1085).

Toninia cumulata (Sommerf.) Th. Fries in Lich. Scand. I: 341 (1874).

Lecidea cumulata Sommerf., in Suppl. Flora Lapp. 157 (1826).

Lecidea conglomerata Sommerf., in Egl. Vidensk. Shrifter II; 54 (1827).

Occasional on limestone at Cape Peron South (UWA 1052); North Beach (UWA 1053); Garden I.; Rottnest I., on friable limestone sea cliffs at Radar Reef (UWA 1089, UWA 1054); Point Mount Henry (UWA 606).

Lecanoraceae

Aspicilia calcarea (L.) Mudd, Manual Brit. Lich. 161, tab. III, (1861).

Lecanora calcarea (L.) Sommerf. in Suppl. Flor. Lappon. 102 (1826).

Lichen calcareus L. in Sp. Pl. 1140 (1753).

Garden I., abundant on sea cliffs at Collie Head (UWA 1036, UWA 1040, UWA 1041); Rottnest I., sea cliffs at Geordie Bay (UWA 1083), limestone outcrops at Serpentine Lake (UWA 1098) and indurated limestone at Lake Herschell (UWA 1084). Apparently rare on the mainland. Cape Peron South, on limestone cliff (UWA 664).

Caloplacaceae

Caloplaca aurantiaca (Lightf.) Th. Fries in Nova Acta Reg. Soc. Scient. Upsalla, ser. 3, III: 219 (1861); and Lichen. Scandin. I: 177 (1871).

Lichen aurantiacus Lightf., Flora Scotica II: 810 (1777); edit. 2, 810 (1789).

Common on limestone and also on bark and wood of coastal shrubs. North Beach (UWA 716); Scarborough (UWA 1027); limestone cliffs of the Swan River Estuary at Point Roe (UWA 796); Blackwall Reach (UWA 1028); Rocky Bay (UWA 795); Kings Park (UWA 849); Garden I., on cliffs at Beacon Head (UWA 1047, UWA 1048); Rottnest I., abundant on limestone about the salt lakes (UWA 1092) and on sea cliffs at Radar Reef (UWA 1088).

Fulgensia bracteata (Hoffm.) Räs., in Die Flecht. Estl. I: 108 (1931).

Caloplaca bracteata (Hoffm.) Jatta in Syiloge Lich. Ital., 236 (1900).

Psora bracteata Hoffm. in Deutschl. Flora 2: 169 (1796).

Common and often abundant on limestone cliffs at Kings Park (UWA 1045); Point Mount Henry (UWA 608, UWA 611); Rocky Bay (UWA 793); Rottnest I., on friable limestone sea cliffs (UWA 861) and on limestone outcrops at Lake Herschell (UWA 1095).

Teloschistaceae

Xanthoria ectanea (Ach.) Räs ex R. Filson in Muelleria 2: 65 (1969).

Xanthoria ectanea (Ach.) Räs in An. Soc. Scient. arg. Secc. S Fe 131: 103 (1941).

Xanthoria parietina var *ectanea* (Ach.) Kickx, in Flore Cryptog. Flandres, 2: 228 (1867).

Parmelia parientina var *ectanea* Ach. in Lichen. Univ. 464 (1810).

Locally abundant on limestone close to the sea and on bark and dead wood of coastal shrubs. Cape Peron South, on limestone (UWA 665, UWA 667, UWA 789); Garden I., at South West Point (UWA 1039); Rottnest I., abundant on indurated limestone about the salt lakes (UWA 1090); North Beach, on dead wood (UWA 715).

Xanthoria parietina (L.) Beltr. in Lichen. Bassan. 102 (1858).

Lichen parietinus L. in Sp. Pl. 1143 (1753).

Occasional on limestone near the sea but more frequent on dead wood and bark of coastal shrubs. North Beach, on bark (UWA 694); Rottnest I., on dead wood (UWA 308); Garden I., on bark (UWA 236).

Buelliaceae

Buellia alboatra (Hoffm.) Branth. and Rostr., in Botan. Tidskrift, IV: 239 (1869).

Verrucaria alboatra Hoffm. Descript et Adumbr., Piant Lich. I, 76, tab. XV (1790), fig. 2 et Deutschl. Flora 193 (1796).

Lichen alboater Hoffm. Enum. Lich. 30 (1784).

Common on limestone close to the sea, becoming less abundant inland. North Beach (UWA 792); Cape Peron South (UWA 790); Garden I., at Beacon Head and elsewhere on limestone (UWA 1038, UWA 1042); Rottnest I., abundant on travertine limestone about the salt lakes (UWA 1094, UWA 1091); Point Roe in the Swan River Estuary (UWA 791, UWA 794); Point Mount Henry on the Canning River Estuary (UWA 605, UWA 609, UWA 612, UWA 791, UWA 794).

Acknowledgements.—We thank Professor W. A. Weber of the University of Colorado Museum, Colorado, for identifying specimens of *Aspicilia calcarea* and *Fulgensia bracteata*. Mr. R. Filson of the National Herbarium of Victoria, South Yarra, kindly verified several of our determinations.

References

Bibby, P. and G. G. Smith (1955).—A list of Lichens of Western Australia. *J. R. Soc. W. Aust.* 39: 28-29.

Fairbridge, R. W. (1950).—The geology and geomorphology of Point Peron, Western Australia. *J. R. Soc. W. Aust.* 34: 35-72.

Filson, R. (1969).—A review of the genera *Teloschistes* and *Xanthoria* in the lichen family Teloschistaceae in Australia. *Muelleria* 2: 65-115.

Fink, B. (1935).—*"The lichen flora of the United States."* Univ. Michigan Press, Michigan.

Fries, E. (1846-47).—Lichenes, in *"Plantae Preissianae sive enumeratio plantarum quas in Australasia occidentali et meridionali-occidentali annis 1834-41"*, Vol. II: 140-145, collegit Ludivicus Preiss. Edit. C. Lehmann.

Lamb, I. M. (1963).—*"Index Nominum Lichenum inter annos 1932 et 1960 divulgatorum."* Roland Press, New York.

Mattick, F. (1954).—Lichenes, in A. Engler's *"Syllabus der Pflanzenfamilien"*, Band 1, Edit. H. Melchior and E. Werderman. Borntraeger, Berlin-Nikolassee.

McArthur, W. A. and Bettenay, E. (1960).—The development and distribution of the soils of the Swan Coastal Plain, Western Australia. *C.S.I.R.O. Soil Publ.* No. 16.

Zahlbruckner, A. (1921-1940).—*"Catalogus lichen universalis."* Vol. 1-10. Borntraeger, Leipzig and Berlin.